

dAu trigger simulations

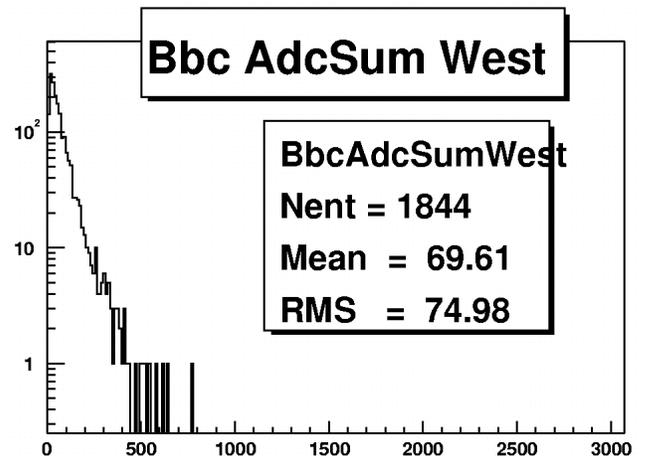
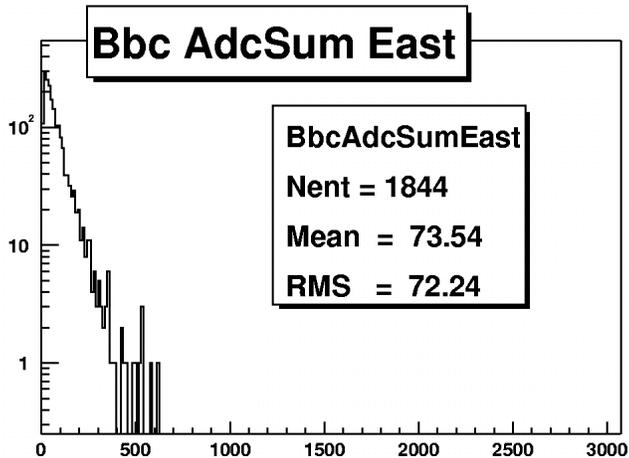
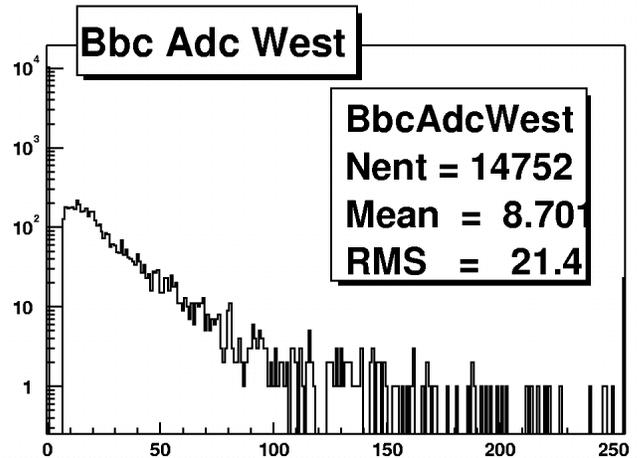
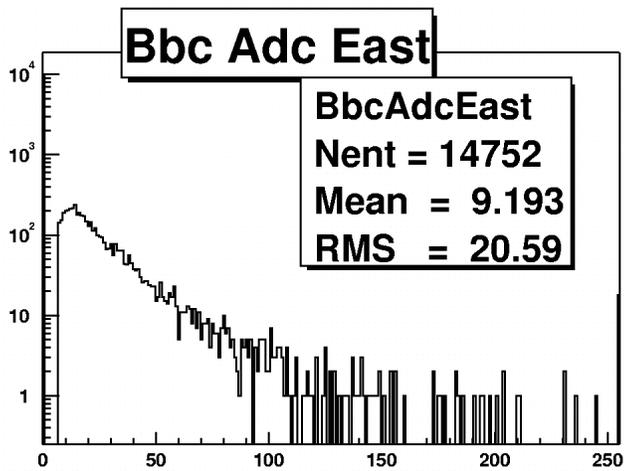
Mikhail Kopytine
Kent State University

October 21, 2002, STAR Trigger Workshop,
BNL.

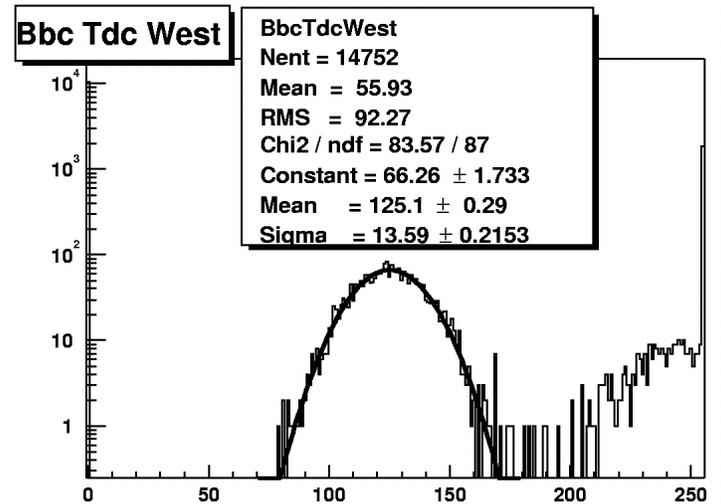
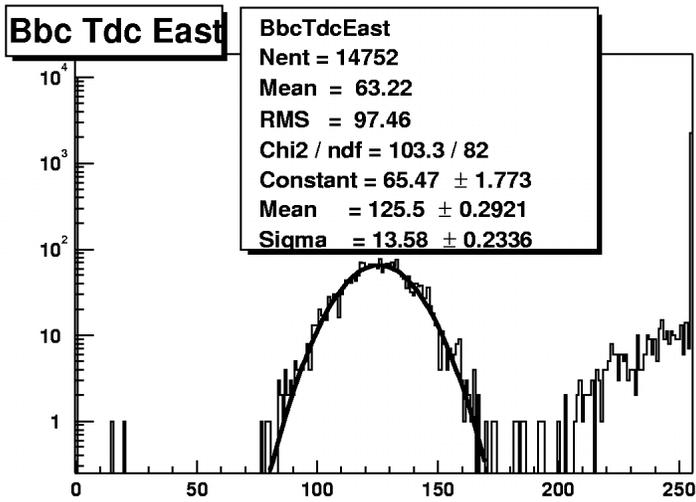
- BBC response simulation
- trigger efficiency – how large is the bias ?

BBC response sim. – the model:

- GEANT geometry (Yiqun Wang)
- geometry of ionization within a tile is ignored
- $dE/dE(MIP) \times 15 \text{ photoelectrons/MIP} = N \text{ photoelectrons}$
- Single photoelectron resolution = 30%
- PMT gain = 0.3 pC/photoelectron; CDB ADC bin = 0.25 pC
- time resolution = 900 ps
- large tiles: multiply output by 0.8 (absorption !)



Check simulation in the 2002 pp setup (8+8 PMTs). MIP peak around bin 20; require 1/3 MIP (15 mV, bin 6) threshold \Rightarrow hit definition.

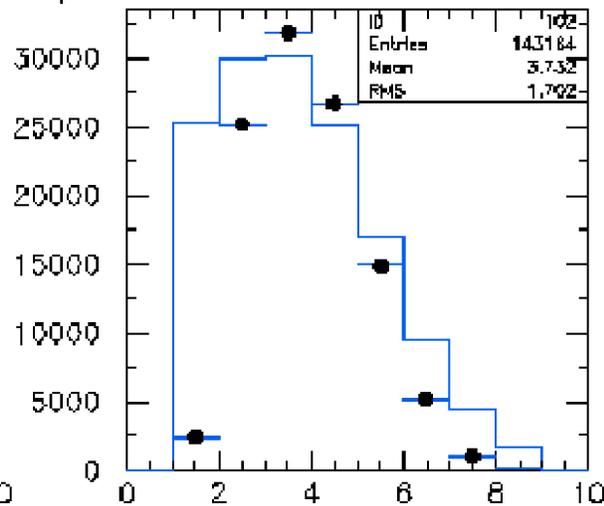
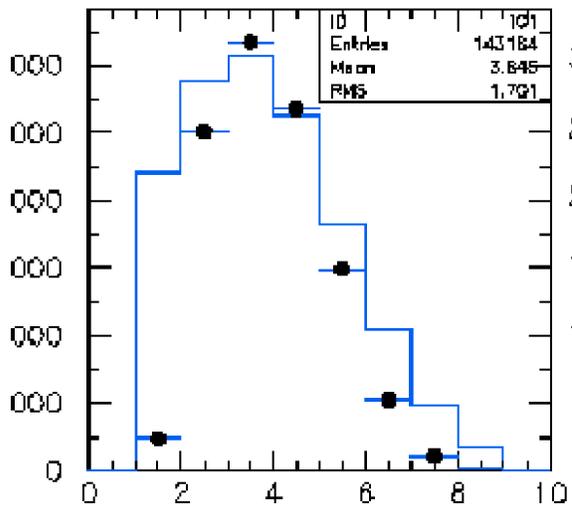


TDC distributions in the 2002 pp setup. δ -electrons are slow: $d\sigma/d\theta \propto \tan\theta$, diverges at $\theta = \pi/2 \Rightarrow$ low p_Z .

1 bin = 0.1 ns.

Asymmetry of slow particles: East > West !

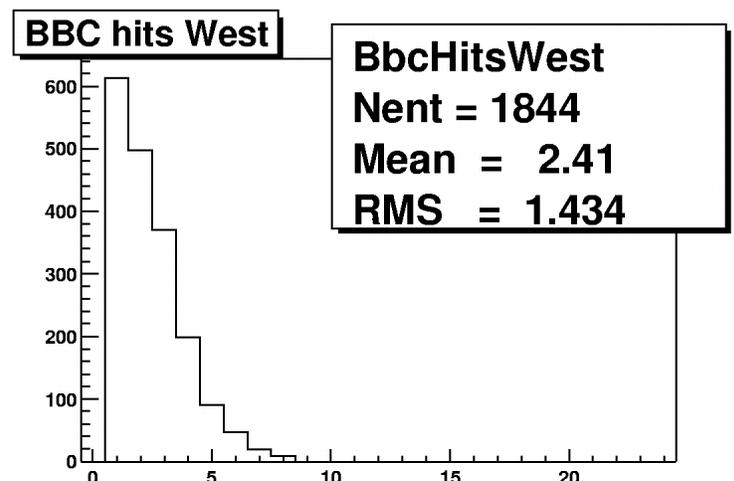
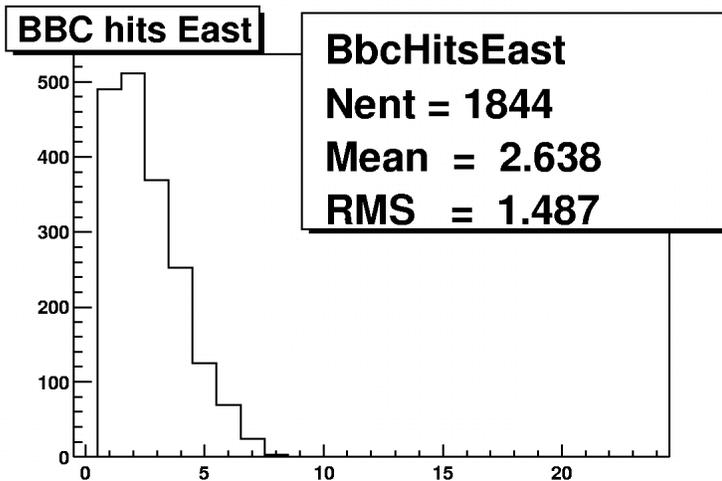
Run 1565 from file datadev/fpdd1565.rz ,Fill 2147 ,Event 6



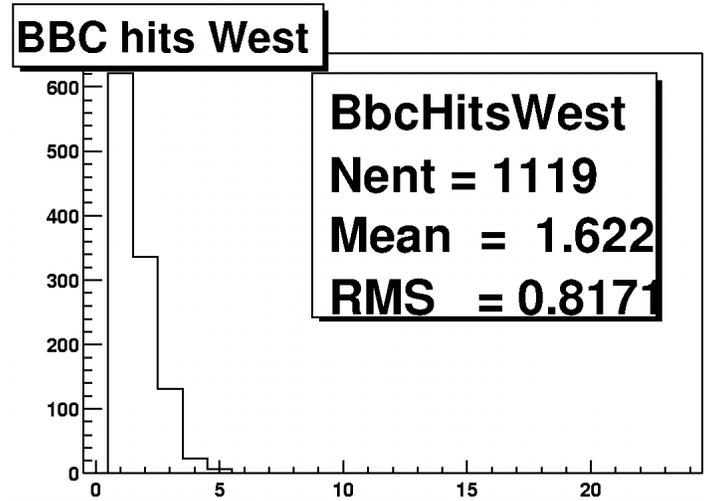
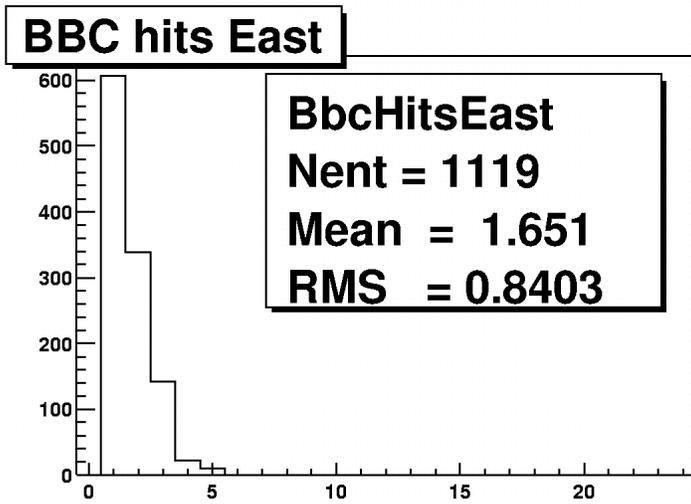
— data
● simulatio

BBC east PMT mult (any east, any west)

BBC west PMT mult (any east, any west)



Top: pp data and simulation from Les Bland;
bottom: GEANT simulation gives a lower number of hits. East/West asymmetry 8% (3% in the data).



Same pp data with time window $80 < TDC < 170$.
East/West asymmetry was due to background
 \Rightarrow apply TDC window and trust the simulation.

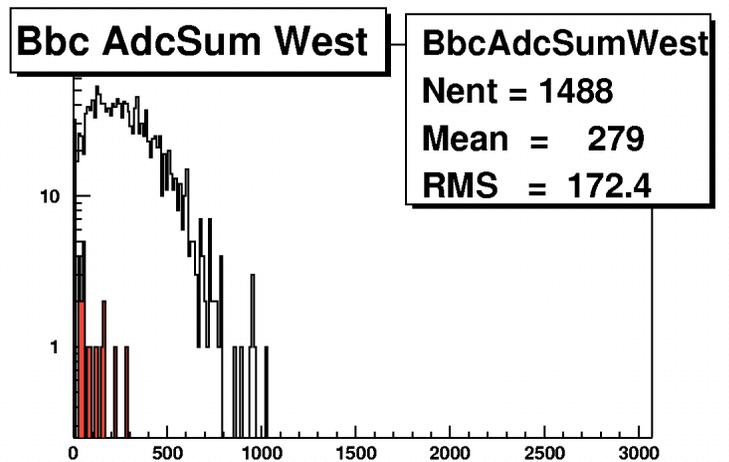
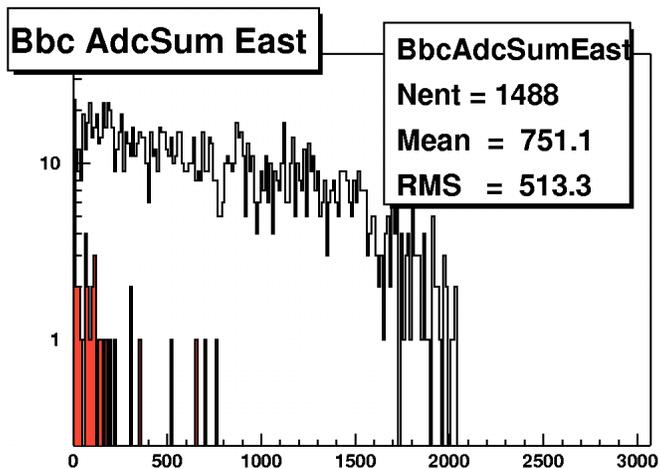
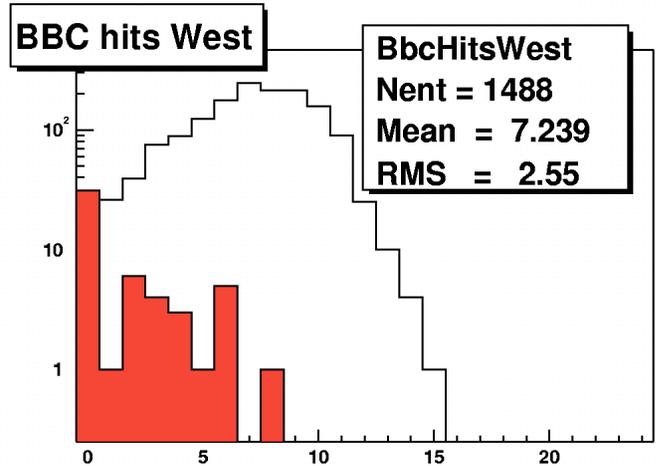
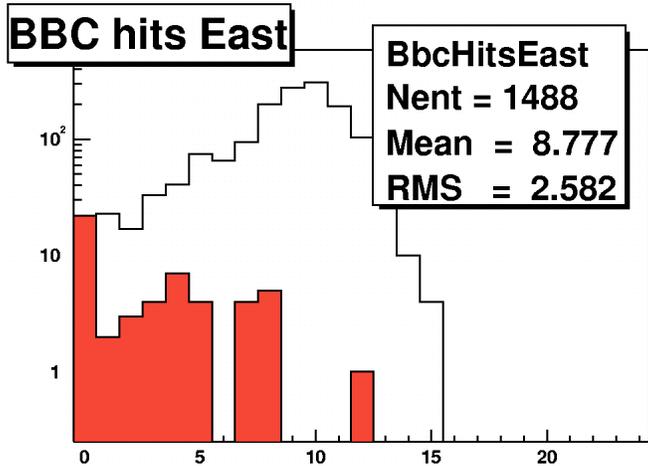
dAu minbias trigger concept:

–TDC window cut

–1/3 MIP (ADC bin $>$ 6) amplitude anywhere in the East AND anywhere in the West

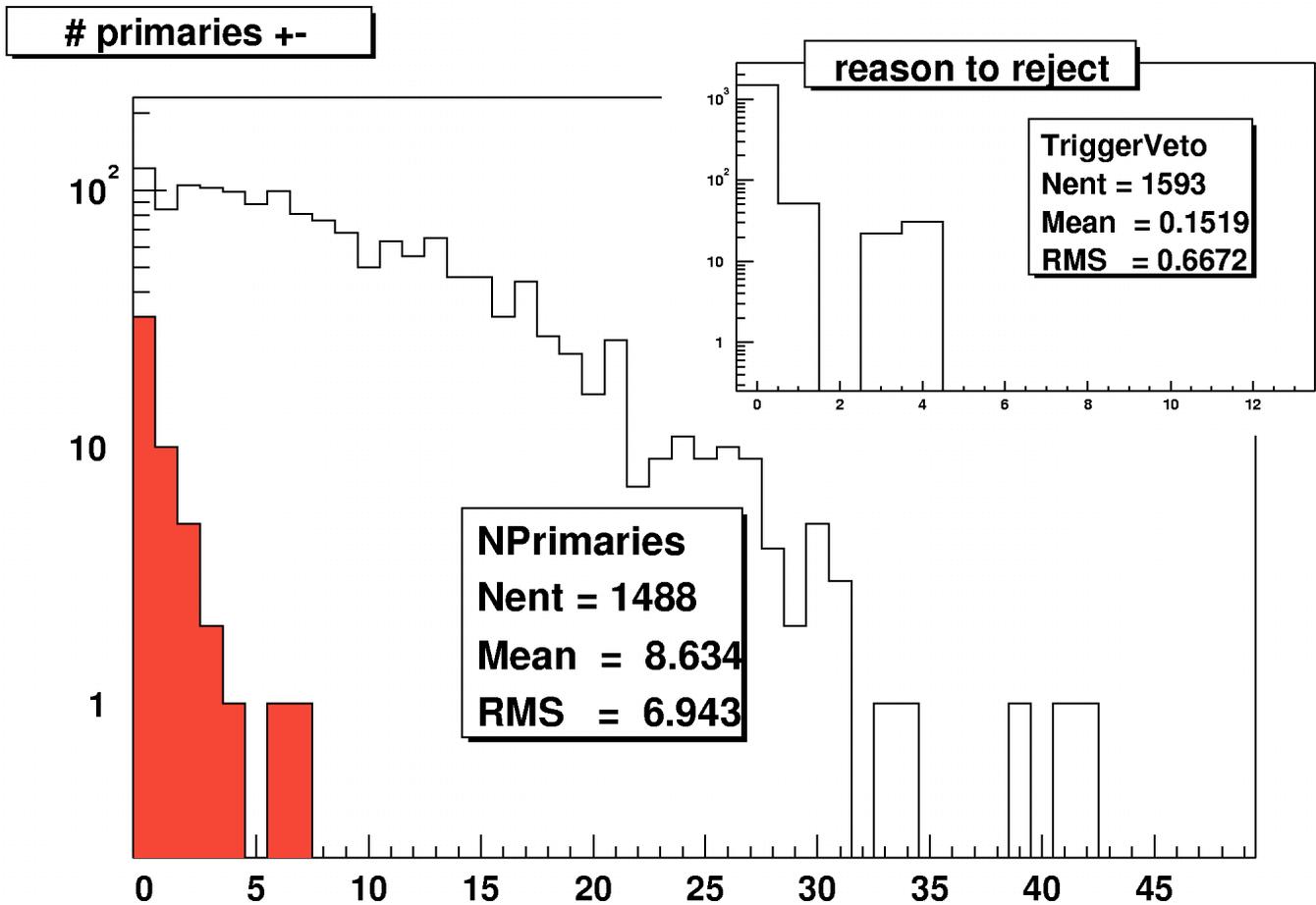
–TDC difference (ignored, no beam-gas in sim.)

dAu simulation:



More multiplicity in the East (Au fragmentation). White: passed trigger; Red: rejected.

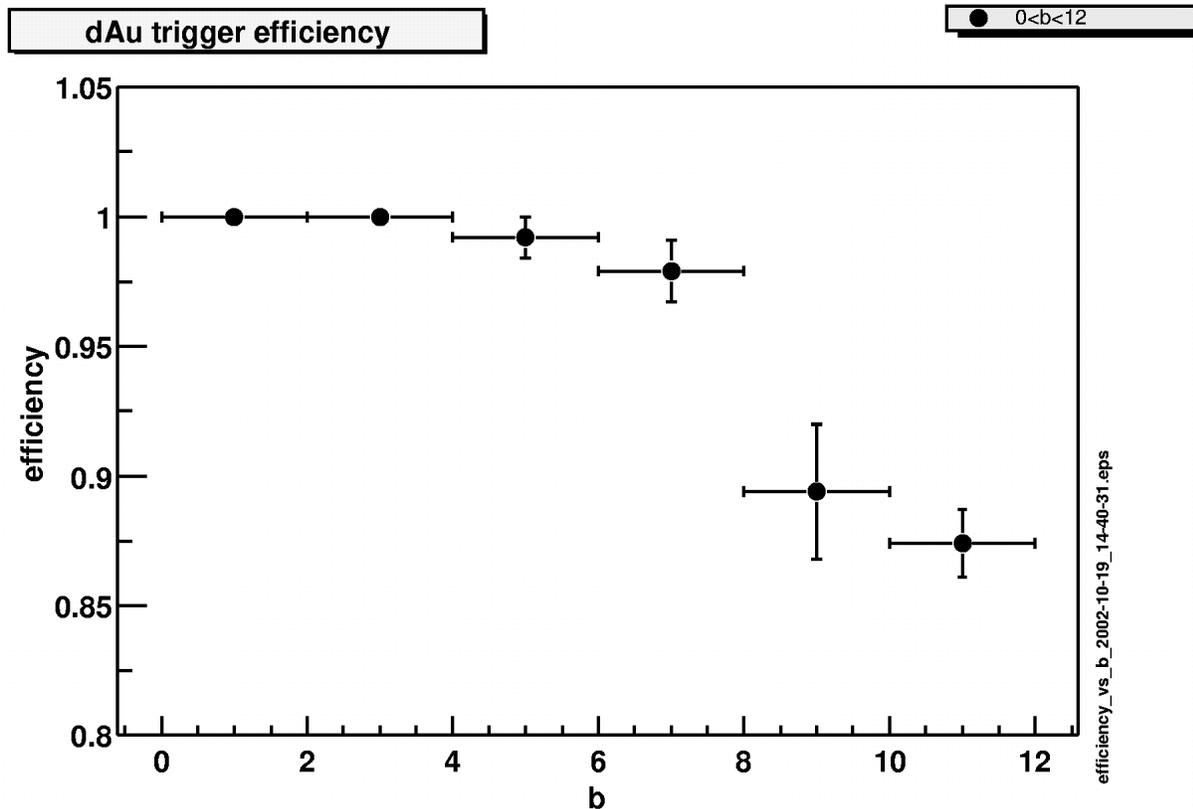
dAu trigger bias: HIJING sample with $0 < b < 12$ fm; Total=1540; Passed=1488; Rejected=52.



of primary tracks in TPC. White: passed, Red: rejected.

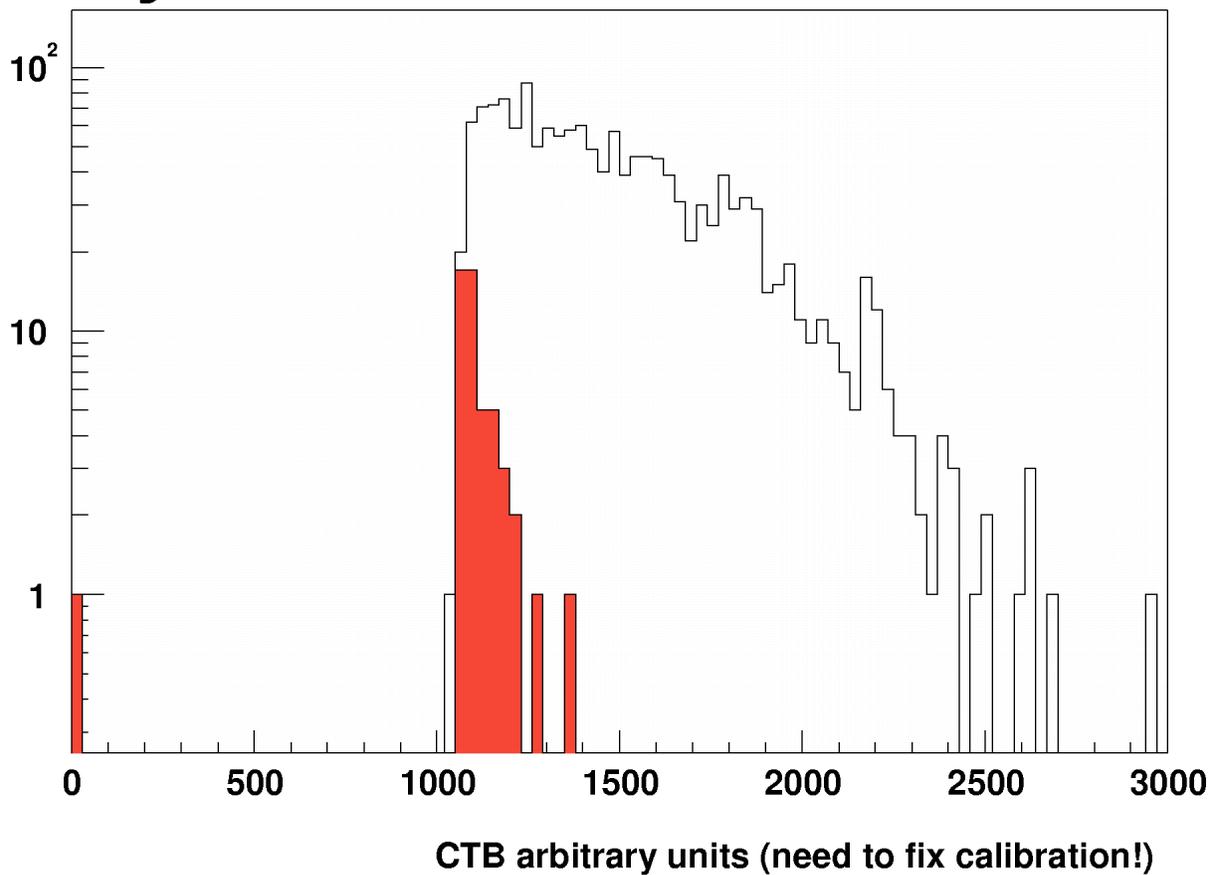
Reason to reject: 0 – no reason, passed; 1 – any reason; 2 – TDC difference (ignored, no beam-gas in sim.); 3 – no East; 4 – no West.

Impact parameter study with HIJING:



$0 < b < 4$ fm: statistics too poor to have rejected events. An overall efficiency from this is $93 \pm 1\%$ (by weighting bins $\propto b_{max}^2 - b_{min}^2$). Grazing collisions \Rightarrow drop in eff.

Can other detectors help improve the efficiency ?



Signal in CTB – White: passed, Red: rejected.

Conclusions

- BBC response simulation available; problems to understand background in GSTAR
- trigger efficiency and bias is evaluated; eff. > 90% possible with BBC trigger
- rejected events have small multiplicity; hard to improve efficiency using other detectors